

CLAIMS

1. An apparatus for producing a thin film electrolyte layer comprising,
means for generating a high density plasma from a supply of at least one plasma gas;
a substrate holder mounted adjacent said plasma generating means;
means for vaporizing a volatile lithium containing precursor;
means for vaporizing a volatile phosphate containing precursor;
means for transporting the vaporized volatile lithium containing precursor and
expelling the vaporized volatile lithium containing precursor into the previously created high
density plasma; and

means for transporting the vaporized volatile phosphate containing precursor and
expelling the vaporized volatile phosphate containing precursor into the previously created
high density plasma;

whereby the volatile lithium containing precursor and volatile phosphate containing
precursor are prevented from mixing with the plasma gas prior to the plasma being created by
the plasma generating means and are expelled only into the previously generated plasma to
prevent decomposition of the precursors.
2. The apparatus of claim 1 wherein the volatile lithium containing precursor is
selected from the group consisting of lithium *tert*-butoxide, lithium hexafluoroisopropoxide, and
lithium tetramethyheptane dionate.
3. The apparatus of claim 1 wherein the volatile phosphate containing precursor is
selected from the group consisting of triethylphosphate and trimethyle phosphate.

4. The apparatus of claim 3 wherein the volatile lithium containing precursor is selected from the group consisting of lithium *tert*-butoxide, lithium hexafluoroisopropoxide, and lithium tetramethyheptane dionate.

5. The apparatus of claim 1 wherein the plasma gas is non-reactive with the volatile lithium containing precursor.

6. The apparatus of claim 1 wherein the plasma gas is reactive with the volatile lithium containing precursor.

7. The apparatus of claim 6 wherein the plasma gas is selected from the group consisting of hydrogen and oxygen.

8. The apparatus of claim 1 wherein the means for vaporizing the volatile lithium containing precursor comprises a metal organic bubbler.

9. The apparatus of claim 1 wherein the means for vaporizing the volatile phosphate containing precursor comprises a metal organic bubbler.

10. An apparatus for producing a thin film battery electrolyte layer comprising,

- (a) means for generating a plasma from a supply of plasma gas;
- (b) means for vaporizing a volatile lithium containing precursor;
- (c) means for vaporizing a volatile phosphate containing precursor;
- (d) means for directing the vaporized volatile lithium containing precursor into the generated plasma;
- (e) means for directing the vaporized volatile phosphate containing precursor into the generated plasma; and
- (f) means for directing the plasma mixed with the volatile lithium containing precursor and the volatile phosphate containing precursor onto a substrate,

whereby the volatile lithium containing precursor and volatile phosphate containing precursor are mixed into the plasma gas only once the plasma is generated.

11. The apparatus of claim 10 wherein the volatile lithium containing precursor is selected from the group consisting of lithium *tert*-butoxide, lithium hexafluoroisopropoxide, and lithium tetramethyheptane dionate.

12. The apparatus of claim 10 wherein the volatile phosphate containing precursor is selected from the group consisting of triethylphosphate and trimethyl phosphate.

13. The apparatus of claim 12 wherein the volatile lithium containing precursor is selected from the group consisting of lithium *tert*-butoxide, lithium hexafluoroisopropoxide, and lithium tetramethyheptane dionate.

14. The apparatus of claim 10 wherein the plasma gas is non-reactive with the volatile lithium containing precursor.

15. The apparatus of claim 10 wherein the plasma gas is reactive with the volatile lithium containing precursor.

16. The apparatus of claim 15 wherein the plasma gas is selected from the group consisting of hydrogen and oxygen.

17. The apparatus of claim 10 wherein said means for vaporizing the volatile lithium containing precursor comprises a metal organic bubbler.

18. The apparatus of claim 10 wherein said means for vaporizing the volatile phosphate containing precursor comprises a metal organic bubbler.